ANNEX A · OS ARCHITECTURE

Name: _____ **Date:** _____

TASK 1 WATCH THE HATCH

18 min · alone

`strace` runs a program and prints every **system call** it makes: every request to the kernel. Type each command exactly.

1. How many requests does it take to list a folder?

```
strace -c ls
```

Last line, column `calls`, row `total`: _____

2. One single request, in detail:

```
strace -e trace=write echo hello
```

Copy the line that starts with `write`: _____ How many bytes were written? _____

3. Opening a file you are allowed to read:

```
strace -e trace=openat cat /etc/hostname 2>&1 | tail -3
```

The first line shown opens `/etc/hostname`. The kernel's answer after the `=` sign: _____

4. Opening a file you are **not** allowed to read:

```
strace -e trace=openat cat /etc/shadow 2>&1 | tail -3
```

The kernel's answer after the `=` sign: _____

DONE WHEN you have four answers and you can say who refused in step 4: the program `cat` or the kernel.

TASK 2 KERNEL OR USER?

12 min · alone, then groups of 3

A. Write **K** (runs in kernel mode) or **U** (runs in user mode).

___ Firefox	___ the scheduler	___ a keyboard driver
___ the terminal window	___ the file-system code	___ LibreOffice
___ the memory manager	___ bash	___ the code that talks to the SSD
___ a game	___ the system-call handler	___ the desktop with its icons

B. In threes: **App**, **Kernel**, **Disk**. The App may speak only to the Kernel. Act each scene, then write what was said.

Scene	The conversation, step by step
1 · Save "hello" in `note.txt`	
2 · Read `/etc/shadow`	
3 · The App talks to the Disk directly	

DONE WHEN the 12 items have a letter and the three scenes are written.

TASK 3 YOUR SHELL, YOUR DRIVERS

18 min · alone

A · The shell.

```
echo $SHELL
cat /etc/shells
```

My shell: _____ Other shells installed: _____ Kernel mode or user mode? _____

B · The kernel and its modules.

```
uname -r
lsmod | wc -l
```

Kernel version: _____ Modules loaded: _____

C · The driver of your network card. (Nothing on screen? Type `network` instead of `ethernet`.)

```
lspci -k | grep -A 3 -i ethernet
```

Card: _____ Kernel driver in use: _____

D · Who wrote that driver? Replace DRIVER with the name you found in C.

```
modinfo DRIVER | grep -E "description|license"
```

Description: _____ Licence: _____

DONE WHEN you can name your shell, your kernel version and the driver of one device of your PC.

TASK 4 THE VERDICT

9 min · pairs

A. Monolithic, microkernel or hybrid? Linux _____ Android _____ Windows 11 _____

macOS _____ MINIX _____

B. A driver crashes. Which kernel design would you choose for each machine, and why?

A machine that keeps a patient alive in a hospital: _____

A gaming PC: _____

TASK 5 EXIT TICKET

8 min · alone, no notes

1. In which mode does Firefox run?

- ☐ a) Kernel mode
- ☐ b) User mode
- ☐ c) Both at the same time
- ☐ d) Neither: it runs in the firmware

2. What is a system call?

- ☐ a) A request from a program to the kernel
- ☐ b) A command typed in the terminal
- ☐ c) An error message from the hardware
- ☐ d) A message between two computers

3. What can a bug in a kernel-mode driver do that a bug in a normal app cannot?

- ☐ a) Close its own window
- ☐ b) Use a lot of RAM
- ☐ c) Slow down the Internet
- ☐ d) Stop the whole system

4. What is bash?

- ☐ a) The kernel of Ubuntu
- ☐ b) A driver for the keyboard
- ☐ c) A shell: a user-mode program to give orders
- ☐ d) The firmware of the PC

5. Which design is the Linux kernel?

- ☐ a) Monolithic, with loadable modules
- ☐ b) Microkernel
- ☐ c) Hybrid
- ☐ d) It has no kernel